

Enhancing Sleep Quality in Hypertension Patients: The Role of a HiAI (Hypertension Alert) Treatment

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ABSTRACT

Background: Poor rest quality could be a frequent comorbidity among people with hypertension, contributing to negative cardiovascular conditions and decreased quality of life. This research assesses the significance of the HiAI (Hypertension Alert) intercession in improving rest quality among hypertensive patients in Jatisari, Jember, east Java. **Methods:** This true experimental study selected one hundred registrants diagnosed with hypertension (50 registrants in the intervention team and the rest in the absence of the intervention team), selected through a straightforward random sampling technique. Participants were randomly assigned to either the intervention team or the rest in the absence of the intervention team receiving usual care from their attending physicians. The HiAI treatment included autonomous motivation, relatedness to health services, and perception of self-competence. Sleep quality was measured at baseline and the start of the research before treatment for both teams using the Pittsburgh Sleep Quality Index (PSQI) one month following the intervention. **Results:** People who took part in the treatment experienced a statistically significant improvement in PSQI scores compared to the absence of an intervention team (24% before treatment and 76% after treatment people who took part in the intervention showing increasing in sleep quality, $p = 0,002$ using Wilcoxon signed-rank test). **Conclusions:** The findings indicate that the HiAI intervention is an effective approach for enhancing sleep quality in individuals with hypertension. HiAI may serve as a valuable tool for hypertension management and cardiovascular health promotion. Further research is warranted to assess its long-term impact and cost-effectiveness.

Keyword: Hypertension; Hypertension Alert; Sleep Quality.

INTRODUCTION:

Hypertension is a major global public health challenge and remains highly prevalent across Asia, including the ASEAN region, particularly in countries such as Indonesia and Thailand, influencing millions and driving

genuine well-being complications. Later research shows that rest quality is closely connected to hypertension, with destitute rest compounding blood weight issues and, in general, cardiovascular well-being. In Indonesia, the predominance of hypertension is outstandingly

high (34.1% of the 282,654 individuals), especially among ladies, with numerous people lacking rest due to different socioeconomic components and way of life choices (Alfi & Yuliwar, 2018). Additionally, hypertension administration frequently falls brief, particularly in rustic regions where get to healthcare administrations is restricted (World Health Organization, 2019).

The role of sleep quality in hypertension management cannot be overstated. Research has shown that individuals with sleep deprivation have been linked to an increased risk of hypertension, with studies revealing that up to 37.7% of hypertensive patients report inadequate sleep (Ayanaw et al., 2022). This relationship highlights the necessity of focused treatments to help hypertension patients sleep better.

One promising approach is a HiAl (Hypertension Alert) intervention, which focuses on strengthening autonomous motivation, enhancing connectedness to healthcare services, and fostering perceived self-competence, while simultaneously increasing awareness and providing resources to improve sleep hygiene among patients. This intervention delivered through health education, regular blood pressure monitoring, reinforcement of adherence to antihypertensive medication, and the active involvement of family members and healthcare professionals to support effective hypertension management. Furthermore, it incorporated counselling on healthy sleep patterns, practical strategies to promote better sleep habits, and community-based support systems to strengthen adherence to these practices. Given that cultural attitudes toward health and well-being vary across settings, adapting the intervention to the local context is essential for optimizing its effectiveness (Thi & Sornlorm, 2024).

Upgrading sleep quality in hypertensive patients through targeted interventions, such as the HiAl Intervention, holds the potential to improve health outcomes. By addressing this often-overlooked aspect of hypertension

management, healthcare providers can contribute significantly to reducing the burden of this chronic condition in both countries.

METHODS:

The population of this research consisted of individuals with hypertension in remote locations, specifically in Jember. A true-experimental study design was used in this research. Additionally, the study included one hundred people who took part (50 registrants in the intervention team and the rest in the absence of the intervention team), selected through a straightforward probability sampling technique. People who took part in this research had to be between the ages of 30 and 60, and diagnosed with hypertension by a doctor in primary healthcare for at least one year. The exclusion criteria were hypertensive patients who had complications or were unable to understand and communicate easily. This study was conducted in Desa Jatisari, from January to March 2025 where participants were divided into two groups: intervention and control. To minimize communication and potential contamination between the groups, each was assigned to a different *dusun* (hamlet) within the village. This geographic separation helped prevent interaction and information sharing between participants during the study period, thereby preserving the integrity of the experimental design.

The intervention comprised health education workshops, regular blood pressure monitoring, reinforcement of adherence to antihypertensive medication, and support from family members and healthcare professionals to promote effective hypertension management. Furthermore, it included counselling on healthy sleep patterns, practical strategies to foster better sleep habits, and community-based support systems aimed at strengthening adherence to these practices. The Pittsburgh Sleep Quality Index (PSQI) was used to measure how well one sleeps both before and one month following the intervention. Although sleep

quality was presented descriptively as good and poor categories, the statistical analysis was performed using the raw PSQI scores within the same group because the data were paired and non-normally distributed. Therefore, the Wilcoxon signed-rank test was considered appropriate for comparing paired pre- and post-intervention measurements and SPSS software were used to analyze the data. Data was collected at the start and one month following the intervention, by applying an online questionnaire strategy. Following the reliability and validity evaluations, the author applied adapted questions from an earlier study (Pratama & Ariastuti, 2016), The calculated r esteem > r table (0.3494) revealed strong authenticity test outcomes for each of the eight inquiries in the PSQI survey, so that these 8 address things were announced solid. The Universitas dr. Soebandi Ethical Committee of Health Research gave its approval for this inquiry, with registry number 223/KEPK/UDS/III/2024.

RESULTS:

Corresponding to the demographic information of the participants, the age categories with the largest amount of those surveyed were those aged forty-five to sixty, which accounted for 58 individuals (38%). Furthermore, more than half of the registrants (64%) were male.

Table 1. Features of the people who took part in this study

Features of the people took part of this study	n	%
Age Range		
30-45	42	42
45-60	58	58
Gender		
Men	64	64
Women	36	36
Final Education		
Never Graduated From school	40	40
Primary Grade School	21	21

Middle-Grade School	14	14
Intermediate Grade School	13	13
Bachelor's or Associate's Degree	12	12
Labor		
Housewife	36	36
Self-employed	24	24
Workers/Farmers/Fishermen	20	20
Civil Servant	12	12
Employee	8	8
Assistance from Family		
Constructive	40	
Destructive	54	57.4
Accessing Healthcare Provider		
Straightforwardly	100	100
Challenging	0	0
Intensity of Motivation		
Elevated	80	80
Limited	20	20

It is clear from the information presented in Table 1, that the the age categories with the largest amount of those surveyed were those aged forty-five to sixty, which accounted for 58 individuals (38%). More than half of the registrants (64%) were male. Forty percent of the people who took part in this research never graduated from school. Thirty-six percent showed as housewife labor, eighty percent having elevated motivation. Furthermore, one hundred percent of the people who took part in this investigation can access healthcare providers straightforwardly due to their health insurance.

Table 2. Sleep Quality

Before Intervention		
Control Group	n	%
Sleep Quality		
Bad	32	64
Good	18	36
Intervention Group		
Sleep Quality		
Bad	38	76
Good	12	24
After Intervention		
Control Group	n	%

Sleep Quality		
Bad	34	68
Good	16	32
Intervention Group		
Sleep Quality		
Bad	12	24
Good	38	76

Table 4. Wilcoxon signed-rank test

Z-before and after intervention	-3.090
Asymp. Sig.	.002

There was a solid relationship between blood pressure in patients with hypertension and rest quality. Hypertensive patients with great rest quality had an altogether higher blood weight control rate than those with destitute rest quality.

DISCUSSION:

The study's findings align with existing research that highlights the importance of sleep quality in managing hypertension (Alfi & Yuliwar, 2018). The HiAl Intervention shows promise in improving sleep habits and, consequently, blood pressure control. More specifically, the findings of this study demonstrate that the HiAl intervention exerts a significant effect on sleep quality among patients with hypertension. This effect is evidenced by the increased proportion of participants with good sleep quality in the intervention group. These findings indicate that a structured and multidimensional intervention can significantly improve sleep quality and may therefore serve as a relevant non-pharmacological strategy for supporting comprehensive hypertension management.

Age can also influence the effectiveness of interventions aimed at improving sleep quality. Younger patients may respond better to technology-based solutions, such as mobile applications for sleep tracking or relaxation

techniques delivered through digital platforms. Conversely, older adults may prefer traditional methods, such as face-to-face workshops or community support groups, which foster social connections while addressing their specific needs related to sleep hygiene. Cultural factors in ASEAN countries play an important role in shaping perceptions of sleep and health. In many ASEAN settings, communal living and strong family support are important social values that may strengthen health interventions. Thailand and Indonesia, in particular, share similar cultural characteristics, including close family relationships, community support, and collective approaches to health and caregiving. These similarities provide a useful cultural background for comparison. However, since this study was conducted only in Indonesia, Thailand is discussed only as a regional and cultural reference, not as the actual setting of the research. For instance, involving family members in educational sessions could enhance adherence to recommended practices for improving sleep quality among older adults (Thawornchaisit et al., 2018) (Thi & Sornlorm, 2024).

Even with lower educational attainment, hypertensive patients can still experience improved sleep quality through targeted interventions. Several factors contribute to this possibility, those are; Simplified Education and Health Literacy, Community-Based Programs, Family Involvement, Practical Demonstrations and Hands-On Training, and Addressing Socioeconomic Barriers. While higher education is generally associated with better health outcomes, individuals with lower educational attainment can still benefit significantly from targeted interventions that address their specific needs and leverage available resources. By focusing on clear communication, community support, practical training, and addressing socioeconomic barriers, it is possible to enhance sleep quality and improve hypertension management in these populations. One of the required components of the management program for chronic or non-communicable

disorders, such as hypertension, is health education. It is crucial to offer health education resources that particularly address hypertension medication to improve drug adherence. To reach all hypertension patients in isolated rural areas with their unique local cultural knowledge, this health education should be carried out in every village (Sya'id, Meldy Tursina, et al., 2023). Educational attainment is an important demographic factor influencing health literacy and hypertension self-management. In the present study, many participants had low educational attainment, which may have affected their understanding of hypertension management and their ability to adopt appropriate health behaviors, including strategies to improve sleep quality. This finding is consistent with previous studies in Indonesia showing that limited education is associated with lower health literacy, reduced understanding of hypertension, and weaker self-management capacity. In Indonesian communities, particularly in rural and semi-rural settings, patients with lower educational backgrounds may have more difficulty understanding the long-term consequences of hypertension and the importance of consistent lifestyle modification and treatment adherence (Leelacharas & Rujiwatthanakorn, 2012). Similar patterns have also been reported in other Southeast Asian settings, including Thailand, where lower educational attainment has been associated with limited hypertension-related health understanding and beliefs that emphasize external factors, such as diet, environmental exposure, and limited healthcare access (Thi & Sornlorm, 2024). People with less academic achievement tend to have little health knowledge, which reduces their capacity to manage hypertension successfully. Therefore, the demographic profile of this study suggests that educational background should be considered when designing interventions for hypertensive patients, particularly to ensure that health education is simple, practical, and

culturally appropriate (Thawornchaisit et al., 2018).

Even with lower educational attainment, being a housewife can still be associated with improved sleep quality in hypertensive patients through a HiAI intervention. While lower education levels can present challenges, tailoring interventions to the specific circumstances and roles of housewives can still lead to significant improvements in sleep quality and hypertension management. By focusing on practical strategies, family involvement, and community support, HiAI interventions can be effective for this population (Thi & Sornlorm, 2024).

According to the American Heart Association (AHA), 2019, motivation is the process that explains the breadth, focus, and perseverance of a person's attempts to achieve their goals, particularly when it comes to effectively treating hypertension. When someone is highly motivated, it shows that they have a strong internal drive and determination to achieve their goals (Hamrahian et al., 2022). The majority were highly motivated to recover from hypertension, according to the study's findings. The statistical tests showed that motivation and medication adherence were related. Because patients have a strong drive and desire to manage their hypertension in order to minimize consequences, responders who are highly motivated are more likely to stick to their drug regimens (Varleta et al., 2017).

Particularly in remote area, physician and nurse are essential in helping individuals with hypertension. For hypertension patients in remote locations, knowledge gained from healthcare providers is one of the most important sources of support and information about therapy management. Throughout the service process, healthcare providers offer comprehensive, long-lasting, and high-quality support in addition to information (Hamrahian et al., 2022).

The findings of this investigation demonstrated that support from healthcare providers was linked to drug adherence. Support

from healthcare professionals is essential for guaranteeing medication adherence in remote areas, where the conditions and cultural aspects linked to hypertension are frequently overlooked (Tursina & Sya'id, 2023). Support from healthcare professionals was associated with higher adherence to treatment among people who took part in this research. The findings are consistent with studies that discovered that medical staff were essential in guaranteeing drug compliance (Ademe et al., 2019).

A viewpoint, conduct, and willingness to accept the disease patient by the family is commonly referred to as family support. Especially during the caring stage of hypertension, family members are seen as helpful people who are always ready to lend a hand. According to Winahyu, the family may deliver a number of support types, including instrumental, emotional, evaluation, and informational assistance (Winahyu et al., 2017). Because family members can remind them to take their medications and provide support during necessary medical visits, for hypertensive patients in remote areas (Sya'id, Tursina, et al., 2023). Furthermore, family support can improve medication adherence (Motlagh et al., 2016). According to statistical tests, family support was linked to hypertension patients' medication adherence, especially in rural areas, which is in line with the findings of earlier research (Hamrahan et al., 2022).

According to the researcher, patients with hypertension get great benefit from the HiAI intervention in terms of their quality of sleep. This programme uses self-management techniques and focused education to help people adopt better sleep habits. Improving sleep is crucial since short sleep duration and poor sleep quality are known to raise blood pressure and make managing hypertension more difficult. Improved sleep quality lowers the risk of cardiovascular problems by promoting more efficient blood pressure regulation.

According to the authors, a number of contextual factors moderate the effectiveness of

the intervention. Reactivity seems to be influenced by age, with younger patients generally more open to technology-based solutions and older patients possibly benefiting more from conventional methods that include social support. Cultural values also play a key role in encouraging adherence and enhancing health outcomes, especially in Asian contexts where family involvement is valued.

The authors contend that even though low educational attainment may create obstacles to comprehension and compliance, straightforward, community-based interventions backed by unambiguous communication and useful, hands-on training can still produce significant outcomes. Additionally, it is thought that effective management of hypertension depends on patient motivation in conjunction with constant support from family members and medical professionals. In conclusion, the authors support a comprehensive and situation-specific strategy for managing hypertension. In order to improve sleep quality and, consequently, cardiovascular health and general quality of life in hypertensive patients, such an approach should incorporate factors such as age, culture, education level, and social support.

LIMITATIONS:

Time

This study has several limitations that should be acknowledged. First, the duration of observation was limited to one month following the implementation of the HiAI intervention. As a result, the study was unable to assess the long-term sustainability of its effects on sleep quality and blood pressure control among patients with hypertension.

Number of Respondents

The study involved a relatively small sample of 100 participants, which may limit the generalizability of the findings. The results may not fully represent the broader population of individuals with hypertension, particularly those

from different geographic regions, demographic groups, and cultural or social backgrounds.

Instrument

Subjective measurement of sleep quality: sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), a self-reported instrument that depends on participants' perceptions and recall. Although the PSQI is a widely used and validated tool, the use of self-reported data may introduce recall bias and response bias, which could affect the accuracy of the results. Future research is encouraged to complement quantitative assessments with qualitative approaches, such as in-depth interviews, to obtain a more comprehensive understanding of patients' experiences and to strengthen the validity of findings related to sleep quality.

CONCLUSIONS:

The HiAl intervention may be particularly effective when implemented through community-based strategies, especially among housewives, younger patients, and individuals with lower educational attainment. These strategies may include home visits by healthcare providers, family participation in educational activities, and practical demonstrations of relaxation techniques. Such approaches may enhance patients' understanding of hypertension management and reinforce the importance of sleep quality as an integral component of blood pressure control.

Furthermore, patients are more likely to sustain positive health behaviors when they possess personal motivation and clearly defined health-related goals. In this context, supportive healthcare providers play a crucial role by delivering clear explanations, addressing patients' concerns, and encouraging active engagement in the management process.

A strong therapeutic relationship between patients and healthcare providers may improve treatment adherence and enhance patients' self-confidence in managing

hypertension. This is particularly relevant for individuals with lower educational backgrounds, as effective communication and supportive interactions may help reduce limitations in health literacy and strengthen trust in medical advice.

Overall, interventions that emphasize motivation, trust, and patient competence may contribute to improvements in sleep quality and hypertension management. Tailored approaches are therefore essential to accommodate the specific needs of different patient groups and to optimize health outcomes.

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